Foreign Animal Disease Report

United States
Department of Agriculture

Animal and Plant
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Veterinary Services

Emergency
Programs

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In This Issue

Current Events

Dogs are being used in the passenger arrival areas of international airports to find prohibited fruit and meat in baggage arriving from foreign countries. The detector dog program was launched July 12, 1984, at four airports: Los Angeles International, San Francisco International, Houston Intercontinental, and John F. Kennedy International. Beagle dogs wearing bright green U.S. Department of Agriculture jackets do the sniffing. Kept on leashes and under the constant supervision of their handlers, they have been trained to

immediately sit when they smell citrus fruit, mangoes, beef, sausage, or other agricultural products. Their handlers then reward them with a small treat. A quarantine tag is placed on each suspicious bag or parcel and a green "A" is marked on the Traveler's Customs Declaration Card. Primary inspection by a U.S. Customs Service inspector is followed by an evaluation of the accuracy of the alert, by a Plant Protection and Quarantine (PPQ) officer.

Six additional detector dog teams are scheduled for 3 months of training at the U.S. Air Force Dog Training Center at Lackland Air Force Base in San Antonio, Texas. Following training, they will go into action at major ports of entry, such as Chicago, Illinois, and Miami, Florida.

Besides being extremely cooperative, beagle hounds have an extraordinary sense of smell. They are gentle with humans and have a puppy-like nature. They don't become nervous or excited when surrounded by the kind of commotion found in baggage inspection areas.

The dogs usually rest for 20 minutes during each hour, or for longer periods if they show signs of tiring or lose interest in their work. They stay with their handlers throughout the work day and are kept in kennels overnight. The dogs' expected working life is from 8 to 10 years. The handler who has been with each dog last has the option of keeping it as a pet.

Two of the detector dogs whose effectiveness was recently evaluated had a success rate approaching 70 percent on baggage from European flights, meaning that 70 percent of their "alerts" were on baggage containing prohibited material.

Civil penalties for amounts up to $50 are imposed on travelers who fail to declare or attempt to smuggle prohibited agricultural products.

In addition to detector dog teams, sophisticated x-ray machines are being installed at certain high-risk airports to enhance the U.S. Department of Agriculture's ability to intercept nondeclared, prohibited plant and animal products. (Dr. Robert R. Ormiston, 301 436-8065)

World Animal Disease Roundup

African swine fever (ASF), appeared for the first time in the Netherlands during March 1986. Feeding of uncooked garbage containing ASF virus is thought to be the means of its introduction. Another notorious foreign disease, hog cholera (HC), reappeared in Great Britain, which had been considered free of the disease since 1971. Otherwise, the incidence of HC worldwide appears to be declining. **Swine vesicular disease** has not been reported anywhere since October 1985, when it was diagnosed in West Germany.

The incidence of **foot-and-mouth disease** (FMD) remained static over the last 4 months. The disease surprisingly did not spill over from Italy into the rest of Europe. The epizootic caused by FMD virus type C seems to be declining after the vaccination of

about 780,000 swine using monovalent type C vaccine.

Some other diseases not heard from for some time are being reported again. There were several occurrences of **Rift Valley fever** in South Africa and **African horse sickness** was diagnosed again in South Africa and Namibia. **Lumpy skin disease** was reported from Zaire, Madagascar, and South Africa. Norway reported **contagious equine metritis** for the first time in January 1986. (Dr. Hans J. Seyffert, Veterinary Attache, U.S. Embassy, Manila, The Philippines)

Imported Hides and Trophies

Veterinary Services (VS) is concerned with the possible introduction of exotic animal diseases into the U.S. through the importation of animal hides and trophies. The importation of hides of ruminants and swine, and trophies of wild animals from FMD countries is restricted by Federal regulations. These restrictions, in effect for many years, require the completion of specified procedures to destroy foreign pathogens.

Hides can be imported without restriction if:

1) the hides originate from and are shipped through countries free of FMD and rinderpest, or

2) they are hard dried ruminant hides, or

3) the hides are from ruminants and are packed wet in solutions of salt and mineral acid in leak-proof barrels, casks or cases, or

4) the hides are from ruminants and have been dehaired with lime for immediate manufacturing into rawhide.

If hides destined for the United States have not met the above requirements, they may be permitted to be taken directly from the port of arrival to a Veterinary Services (VS) approved establishment for further processing.

Wet or fresh ruminant hides must be soaked in a solution of sodium biflouride for at least 24 hours. Dry swine hides must be soaked in either a heated water bath, or a molar salt solution. However, if the swine hides are wet they must be soaked in a solution of sodium bifluoride.

Animal trophies that are fully tanned and ready for display, including horns, antlers, and clean dry bones for museum purposes, may be imported without restriction.

Bones, hoofs, antlers, and horns that are not dry and free of flesh and sinew, or that are used in industrial processes that require cutting and grinding (knife handles, belt buckles, etc.), must be boiled or heated with steam for 30 minutes.

If an importer cannot or will not comply with the above requirements then the hides or trophies are refused entry at the port of arrival. The importer has the option of returning the hides or trophies to the country of origin or having them

destroyed. The importer must pay the costs of return or destruction.

Regulations are being amended to prevent the introduction of exotic ticks with imported trophies and hides. These amendments and other changes in regulations are needed from time to time to ensure that import requirements reflect the current status of knowledge on exotic disease prevention. (Dr. Michael J. Gilsdorf, 301 436-8383)

International Reference Laboratories

The appearance of animal diseases in susceptible populations can be devastating to agricultural societies. They may have serious consequences not only to the owners, who are immediately concerned, but also to urban dwellers through the effects of resulting shortages. They affect national economies through interference in international commerce.

By actively assisting governments to respond and recover from the effects of severe animal disease outbreaks, the Food and Agriculture Organization of the United Nations (FAO) has supported the development of disease diagnosis, vaccine production, and strategies to deter the effects of diseases, particularly the economically more devastating ones.

In a recent effort to intercept the movement of animal diseases, FAO has identified specific laboratories with recognized capability for dealing with certain diseases, to serve as Regional Reference Centers and provide training and service, in addition to their normal national responsibilities. The objective is to identify centers of excellence that are technically able and politically willing to assist other governments of the region to deal with invasion by a disease that provides a new and unique challenge to their resources.

For example, the United States Department of Agriculture (USDA) Foreign Animal Disease Diagnostic Laboratory (FADDL) at Plum Island, New York, has been designated as the FAO Reference Center for the world for African Swine Fever; for the Western Hemisphere, for several diseases considered exotic to the region; and for Central and North America, for vesicular diseases, including FMD. The USDA National Veterinary Services Laboratories at Ames, Iowa, has accepted the diagnostic responsibility for the Western Hemisphere for Newcastle disease and avian influenza and for North America for hog cholera.

To assist FAO in carrying out the review of potential reference centers, William M. Moulton, Clinical Professor, International Veterinary Medicine, Tufts University School of Veterinary Medicine, recently visited 26 laboratories in 20 countries throughout Asia, Australia, Eastern and Western Europe, Latin America, and North America to evaluate their technical capability, resources, bio-containment, and to determine the appropriate region to be serviced. (Dr. Moulton may be contacted at P.O. Box 36, East Dover, VT 05341, 802 348-7996)

Mexican Border Security

Surveillance activities by APHIS, VS help assure that foreign animal diseases and pests will not cross the Texas-Mexico border. The resultant security is actually the result of a concerted effort involving more than one unit of VS. A Tick Eradication Program sends mounted inspectors along the banks of the Rio Grande River each day to prevent stray animals from entering the United States. In the course of these patrols, the health of local livestock is observed and any significant abnormality noted for possible followup action by a team from the Border Surveillance Unit.

The surveillance team is comprised of six animal health technicians, a secretary, and a veterinarian. Each technician is assigned a district as his primary responsibility. He maintains liaison with the county extension agent, agricultural teachers, veterinarians, feed store operators, farmers, and ranchers. Any unusual event associated with livestock health is investigated.

If warranted, the premises of concern may be visited. The surveillance extends from Brownsville to Laredo, Texas.

Sera are collected from all Rio Grande Valley swine as they are slaughtered. Most of the marketed swine are slaughtered in San Antonio on Monday of each week. Veterinary Services technicians collect and identify the sera, then submit them to the National Veterinary Services Laboratories (NVSL) at Ames, Iowa, where they are tested for hog cholera and African swine fever antibodies. In the event of a positive test result, a visit is made to the premises of origin to examine the herd and determine possible followup actions.

Veterinary Services personnel regularly inspect all swine garbage feeding operations near the Mexican border. All swine and poultry producers are contacted routinely and the health status of their livestock is evaluated.

Prompt action by surveillance teams has prevented the spread of hog cholera and exotic Newcastle disease from local outbreaks.

The cooperative effort that exists between the Tick Eradication Program, Texas Animal Health Commission, Border Surveillance Unit, and the livestock industry assures an effective surveillance program. (Dr. Victor H. Driscoll, USDA, APHIS, VS, Laredo, TX)

Swine Exported to China

The fourth and by far the largest shipment of breeding swine from the United States to the People's Republic of China has been released from quarantine, continuing the development of trade between the two nations.

The shipment of 1,836 swine from Kentucky arrived in Guangzhou, China, in December and was immediately placed in post-entry quarantine for observation and testing.

The Chinese are interested in importing animals from the United States to introduce new breeding stock and to increase their

production. They are especially interested in swine because of the high quality of U.S. pork and pork products.

Under a 1984 agreement, the Chinese require imported U.S. livestock to undergo rigid quarantine, testing, and shipping procedures.

The swine just released from quarantine were tested for several diseases on the farms of origin in the U.S. before being isolated from other animals for 30 days while they were retested prior to shipment. The swine were then flown to China where they were placed in quarantine for 45 days during which they were tested again to assure the Chinese that the animals were healthy before release.

A November 1985 meeting in China between USDA and Chinese representatives led to the renegotiation of some of the testing requirements that will simplify the process of exporting swine in the future. Preliminary discussions also were held on importing Chinese swine into the United States and exporting bovine semen and embryos from the United States to China.

Chinese swine produce large litters and are highly desirable for cross breeding. No agreement has yet been reached on exportation of U.S. bovine semen and embryos to China, but discussions will continue.

The 1984 agreement between China and the United States opened the door for trade between the two nations in cattle, poultry, and swine.

There is intense interest in U.S.-Chinese trade in livestock. China has a great potential as an export market for animals from the United States. Over 1,190 cattle were shipped on seven flights throughout 1985. Two more shipments of Holsteins, 173 from Wisconsin and 180 from Pennsylvania, were exported in January 1986. (Adapted from news release from USDA News Division, 301 436-7799)

Avian Influenza Virus Genetics

A recently reported investigation studied the genetic origin and genetic changes that led to the appearance of the highly virulent influenza virus strain H5N2 of chickens (Chicken/Pennsylvania/1370/83). (Bean WJ, Kawaoka JM, Wood JM, Pearson JE, and Webster RG. 1985. Characterization of virulent and avirulent A/Chicken/Pennsylvania/83 influenza viruses: Potential role of defective interfering RNAs in nature. Virology 54:151-160.) The results of these studies showed that the virulent virus isolates were derived directly from preceding avirulent viruses. The avirulent virus, which first appeared 5 months before the detection of the virulent strain, was shown to be closely related to viruses commonly found in wild ducks and domestic turkeys.

The most probable sequence of events that led to its appearance is that a recombinant virus of the H5N2 serotype was generated in waterfowl and had limited ability to replicate in chickens. This virus was either introduced directly into a chicken population or alternatively, introduced into turkeys and then into the chicken

population. The virus then replicated undetected for an unknown period of time--at least several months, possibly much longer. In April 1983, the virus had become well enough adapted to the new host to spread readily and cause recognizable clinical signs of disease. At this time the "avirulent" virus was isolated. Random mutations in the avirulent virus then generated the virulent virus. One critical mutation in the virus hemagglutinin has been located. The importance of other mutations in hemagglutinin and in the other genes is not known.

Although not directly related to the goals of the reported project, work with this virus has led to the development of a model system for the study of drug-resistant influenza virus strains, and it has provided a valuable model for the study of the genetic factors affecting virus virulence.
(William J. Bean, Jr., St. Jude Children's Research Hospital, 332 N. Lauderdale, P.O. Box 318, Memphis, TN 38101)

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Focus on... African Swine Fever

African swine fever (ASF) is a contagious febrile, systemic, viral infection of swine caused by an Iridovirus. In the family Iridoviridae, ASF is the only virus that infects mammals; the others infect arthropods, amphibians, and fish. Until 1958, ASF occurred in Africa; then it was diagnosed in Portugal and was eradicated. The disease reappeared in Portugal in 1960, spread to Spain, and since then has been endemic in the Iberian Peninsula. Since 1960, ASF has occurred in several Mediterranean countries, France, and most recently (1985) in Belgium. Today in Europe, ASF is present in the Iberian Peninsula and Sardinia. In the Western Hemisphere, ASF first occurred in Cuba in 1971; it was eradicated. The disease was next diagnosed in Brazil in 1978, Dominican Republic in 1978, Haiti in 1978, and Cuba in 1979. Although these countries have subsequently announced that they have eradicated ASF, the United States has recognized only the Dominican Republic as ASF-free.

Reservoir - Epidemiology

For many years the reservoir for ASF in southern Africa was thought to be indigenous wild pigs, particularly the warthog, because they are susceptible but do not die as a result of ASF virus infection. The soft tick was identified as a vector. Then it was learned that once a tick was infected it would remain infected through the remaining stages of development (transstadial transmission), ASF virus would pass through the egg to the next generation of ticks (transovarial transmission), and female ticks could be infected by insemination by infected male ticks. When soft ticks from southern Africa are fed on an infected pig, a few ticks subsequently die; however, when soft ticks from other than southern Africa, e.g. southern California, are fed on an infected pig, a large percentage may die.

The role of the warthog now appears to be one of an amplifier of the virus. Baby warthogs in the burrow are bitten by infected ticks, develop a viremia, and are then a source of infection for noninfected ticks. It is believed that a virus concentration of

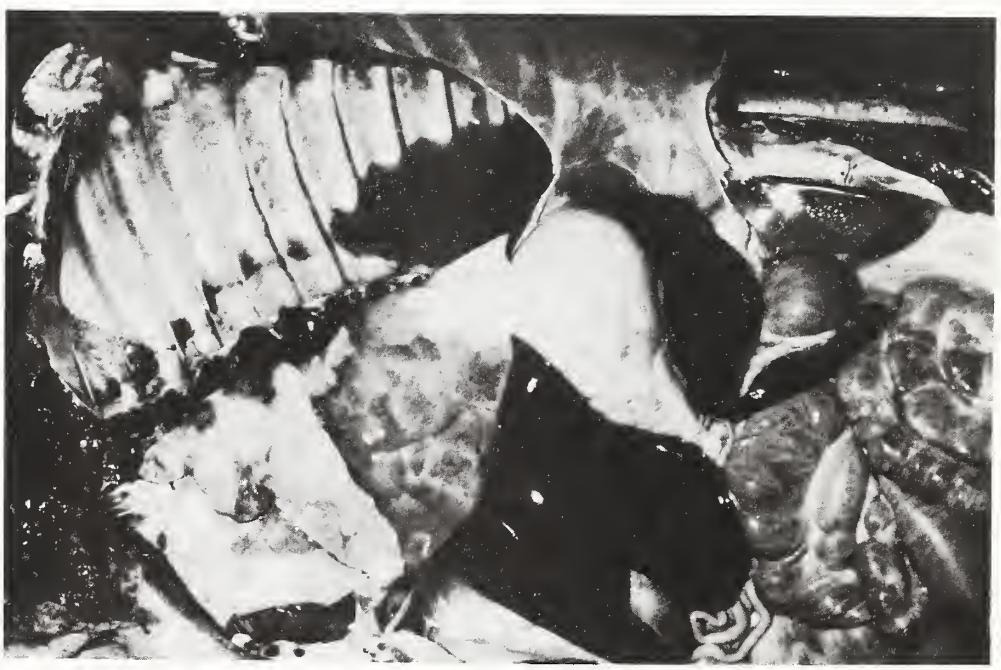
at least 100,000 infective units per ml blood is needed to infect arthropods. The adult warthog that has an antibody titer usually does not have a sufficiently concentrated viremia to infect ticks. In light of these facts, the consensus now is that ASF virus is a tick virus and the pig is an accidental host. Once a population of ticks becomes infected, it may remain infected for many years.

Disease Cycles

Since 1963, the incidence of ASF in the Iberian Peninsula has peaked about every 7 years. If the immunology of ASF were similar to other viral diseases, this cyclic incidence could be expected because ASF antibodies would cause a decreased incidence of disease and thus permit the development of a susceptible population. It is interesting to note that hog cholera has cycled about every 8 years in Europe. Although ASF antibody (IgG) does not neutralize ASF virus, it has been shown experimentally that the severity of the disease is significantly reduced in piglets that are born to and nurse a convalescent dam. Therefore, antibody does influence the course of the disease.

Clinical Forms of Disease

The clinical form of ASF in the Iberian Peninsula in 1958 has changed over the years. The disease that was introduced was highly virulent; this form of the disease is characterized by an almost 100 percent mortality 7-10 days after inoculation and is the form most frequently described in the literature. Today, ASF viruses isolated from the Iberian Peninsula can be classified as moderately virulent--the pigs will develop a high fever for 10-14 days or more but many will survive and mature, or as low virulent--the pigs may only seroconvert. The survival of infected pigs has resulted in the spread of ASF to other European countries and the Western Hemisphere. Recovered pigs are persistently infected and the virus will survive for some time in many products produced from these pigs. The spread of ASF to other countries usually has been due to the feeding of garbage containing ASF-infected pork.



Classical Form

The classical clinical signs and lesions of highly virulent ASF are: high fever, reddened areas of skin, very enlarged dark friable spleen, very enlarged dark blood clot-like gastrohepatic lymph nodes, enlarged dark renal lymph nodes, petechiated kidneys, and edema of the lungs. Other lesions include hemorrhage on the peritoneum, heart, and renal pelvis, and edema of the gall bladder. Peripheral lymph nodes may be edematous. Mortality is usually 100 percent, 5 to 8 days after onset of fever. Little or no antibody is formed and tissues are positive by the direct immunofluorescent test up to the time of death.

Moderate Virulence

Clinical signs and lesions in moderately virulent ASF infection can be similar to but not as severe as those seen in the highly virulent form; the spleen may not be as large and retains normal color and texture, and the gastrohepatic and renal lymph nodes may not be as hemorrhagic. Mortality may be low. When death occurs, it is usually 9 days or more after the onset of fever.

In a breeding herd, abortion may be one of the first signs. At 6 days after infection, circulating antibody can be present and the tissues may be negative for ASF antigen by direct immunofluorescent test.

Some reasons for the differences in the above forms of the disease are: The highly virulent virus causes extensive necrosis, particularly in the spleen, and necrosis allows the spleen to become distended with blood; the moderately virulent virus infects the same cells but most survive; the difference in antibody production may result from the fact that the virus replicates preferentially in antigen-presenting cells of the mononuclear phagocytic system; the highly virulent virus kills these cells before the immune response is initiated, while cells infected with the moderately virulent virus retain some normal function and thus initiate antibody production. The immune response in pigs infected with a moderately virulent ASF virus is similar to that in other viral infections; IgM is present at 4 days and IgG at 6 days after infection. The peculiarity of ASF is that the circulating antibody does not neutralize the virus or eliminate the viremia.

Low Virulence

Low virulence ASF infection in growing pigs may cause only seroconversion. In a breeding herd, there may be abortions. To confirm ASF as the cause of abortion, at least a heparinized blood sample from the dam must be submitted to the laboratory in addition to fetal tissue because aborted fetuses are a poor source of virus.

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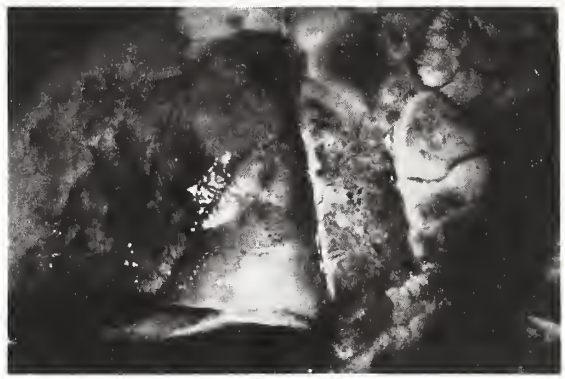

Chronic

In chronic ASF, any or all of the following clinical signs and lesions can occur: fever, skin thickening and necrosis, arthritis, consolidated pulmonary lobules and necrosis, lymphadenopathy, and pericarditis.

Virus Replication

African swine fever virus replicates in the cells of the mononuclear phagocytic system. The virus does not replicate in epithelial tissue; therefore, the amount of virus exteriorized is low unless there is bleeding. Blood during the febrile period can have a viral titer of 100,000 infective units per ml or higher. It has been estimated that 90 percent of the virus in the blood is attached to the erythrocytes.

One surprising feature in an ASF infection is that pigs can have a fever of 41°C (106°F) or higher for a week or more and still appear in quite good condition. In both of the above forms of the disease diarrhea is variable. Diarrhea is most likely caused by a secondary proliferation of enteric bacteria. African swine fever infected pigs do not show any sign of encephalitis.

Experimentally infected pigs have had a higher than expected mortality from gastric ulcers. Fatal gastric hemorrhage most likely results from the thrombocytopenia that develops in acute ASF infection.

Laboratory Diagnosis

Laboratory confirmation is required for a diagnosis of ASF. When ASF is suspected, the Federal Area Veterinarian in Charge must be contacted and arrangements made for the submission of specimens to the Foreign Animal Disease Diagnostic Laboratory (FADDL), at Greenport, NY.

In the laboratory, specimens can be tested for ASF viral antigen, virus, and antibody. When specimens are examined for both ASF antigen and antibody, nearly all of the positive cases will be readily identified. Inoculation of porcine buffy coat cultures is a good way to isolate the virus. However, all cultures negative for hemadsorption should be tested by the direct immunofluorescent test to rule out a nonhemadsorbing ASF virus.

The most sensitive method for isolating ASF virus is inoculation of a susceptible pig.

When performing a necropsy on a pig, remember to suspect ASF if one or more of the following are found: enlarged spleen, enlarged hemorrhagic gastrohepatic lymph node, enlarged hemorrhagic renal lymph node, and an unusual lobular pneumonia. (Dr. Charles A. Mebus, Plum Island Animal Disease Center, Agricultural Research Service, USDA, Greenport, NY 11944. 516 232-2500)

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